below). Another type of segment map is the default segment that is used when there are no interconnect elements in the SAN. This segment simply contains the set of devices that comprise the SAN.

FIGURE 31 depicts a segment map display 200 containing a set of devices 206, 212, 214, 216, 218, and interconnect elements 208, 210. Graphical objects 202 are provided for traversing the associated levels of the hierarchy. The segment map 204 could be displayed, for example, as a result of an administrator selecting the segment graphical object (FIGURE 29, items 186 or 180) on the SAN map (FIGURE 29, item 170).

The displayed map 204 contains a graphical object for the interconnect element 208, and graphical objects for each of the devices 212 – 218 connected to the switch 210. The devices 212 – 218 can comprise hosts, storage devices, and other elements. Each of the devices 212 – 218 is connected to a respective port on the switch 210. Item 206 denotes that there are multiple devices connected to a particular port on switch 210, and therefore comprises a segment of its own. Selecting item 206 in the main panel displays the corresponding map shown in FIGURE 32.

FIGURE 32 depicts a ring segment 220, which is another type of segment map that is used when there is more than one device 228 – 238 connected on a particular port of a switch 226. Instead of displaying all of the devices on the interconnect element map they are instead represented by a nested ring segment graphical object (FIGURE 31, item 206). Selecting (drilling into) the graphical object displays the devices 228 – 238 that comprise the ring segment 224.

In some embodiments of the invention, the selected status of components or interconnects is displayed in alternate form, e.g., highlighted with different colors, blinking, or having a textual message, to indicate the particular status, e.g., failed, missing, suspect, etc. In addition, the display of segments containing such components can be similarly altered to reflect that they contain components or interconnects of such status, e.g. failed. For example, referring to FIGURE 32, a failure of item 238 results in the failure status getting propagated through all of the screens presented by the display. The failing device 238 on segment map 224 results in the upper level maps indicating a failure within the hierarchy. Selecting the icons at each level that indicate failure status will eventually reach the map showing the failed component 238.

In still other embodiments of the invention, there is provided a "default" segment that is displayed as containing all devices (e.g., hosts and storage devices) for which the SAN manager 20 does not have connection information.

Hierarchical File System Extension Policy

As noted previously, the manager 20 utilizes a "policy" to extend file systems on host machines 12. Thus, for example, referring to FIGURE 27, the manager 20 responds to a file system extension request from an agent 24 to assign storage devices 14 to the associated host 12 based on a policy that establishes maximum and minimum extension size boundaries for that host.

More particularly, in the illustrated embodiment, associated with each host 12 is a set of attributes defining a policy for file system extension. These include

a monitor flag indicating whether or not the file system of the host is being monitored by its associated agent;

an extend flag indicating whether or not the host file system can be extended;

a threshold value defining a point at which the host file system is to be extended;

a LUN group defining storage devices onto which the file system can be extended;

an extension minimum size defining the minimum increment by which a file system can be extended;

an extension maximum size defining the maximum increment by which a file system can be extended;

a max file system size defining the maximum size a file system can be; and

an alert interval defining how often event notification is provided.